Relation between Remittances and Fish Production in India

Awadhesh Kumar[1], Aditya Aman[2]

1. **Dr. Awadhesh Kumar, Head, Department of Economics, R.K College, Madhubani, Bihar, e-mail: kumar.awadhesh205@gmail.com**
2. **Aditya Aman, Ph.D Scholar, PG Department of Economics, Lalit Narayan Mithila University, Darbhanga, Bihar.**

Abstract: *Fish is the ancient food since the primitive age in the World. As development of the World this food item has not diminished its prestige even source of income has been changed. Now these days, remittance is considered as one the financial source of income of the poor nations or developing nation like India. So this paper has the objective to identify the causal relationship between fish production and remittances income in India since 1975 to 2022. For this purpose this paper has applied Granger Causality test and concluded that there is a unidirectional Granger causality from fish production to remittance income in India.*

Keywords: Remittances, Fish Production, Unit Root test and Granger Causality.

1. Introduction:

On account of, fish farming is now seen as a significant production option for supplying the world's growing protein needs. Similarly, Prem et al. (2015) contended that fisheries provide a living for over 30 million fishers, fish growers, and their families worldwide. Fish are an important source of minerals and vital fatty acids, and they make up over 16% of the animal protein consumed by people worldwide. Fish is a significant source of high-quality protein that is necessary for human nutrition. When compared to other animal protein sources like beef and poultry, it contains the highest concentration of easily metabolized high-quality protein, lipids, vitamins, calcium, iron, and important amino acids (Ayoola, 2010). Therefore, since the beginning of human evolution, fish has been the primary sustenance for human survival.

Naturally, there are two sorts of water sources that are the primary source of fish production: inland water sources and sea (Marine) water sources. Ponds, lakes, rivers, and the like are examples of inland water sources, whereas the sea and ocean are examples of marine water sources. Because both marine and inland fishing are significant food production systems that can support food and nutrition safety, the methods used to produce fish under these two sources differ, as do the types of fish (Mishra, 2021).

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As far as fish production in India is concern, nearly 4.0 million Indians depend on the marine fisheries industry for their living, and a sizable section of the population gets their food and nourishment from it. Additionally, it boosts the nation's export revenue while harvestable potential of 4.414 million metric tonnes (Sathianandan, 2017). Fig.1 also explains the increasing pattern of per capita fish production in India.
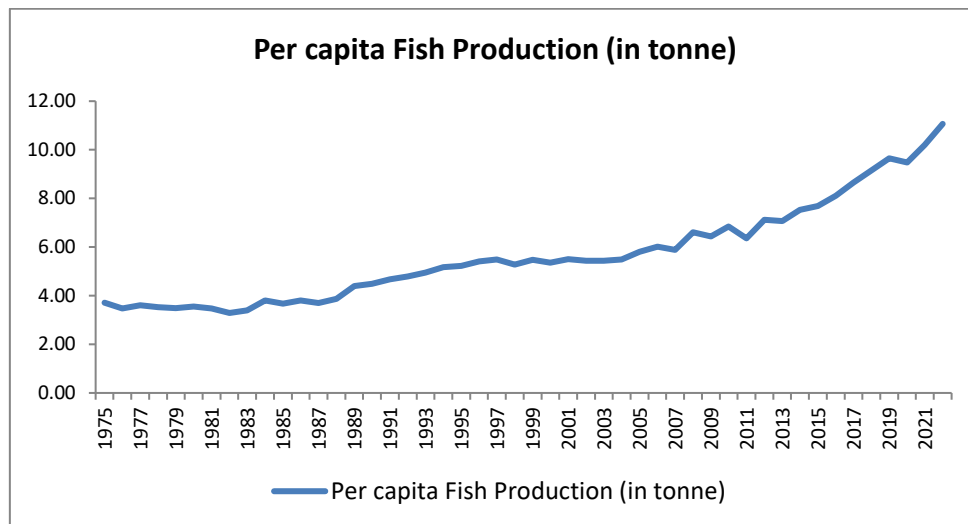

Fig.1 per capita fish production in India

As far as remittance receiving nation is concern, India become the largest remittance receiver nation in the World. The per capita remittances receiving in India has been shown in increasing order since 1991 (Fig.2). Remittance is one of the financial sources of India, particularly in rural areas. On the other hand, vast majority of rural residents, aquaculture and fisheries have become a vital source of food, protein, nutrition, livelihood, and jobs. As a result, both per capita remittances and fish production in India has been in positive direction (fig.3).

Thus the objective of this paper is to identify the relation between remittance and fish production in India.

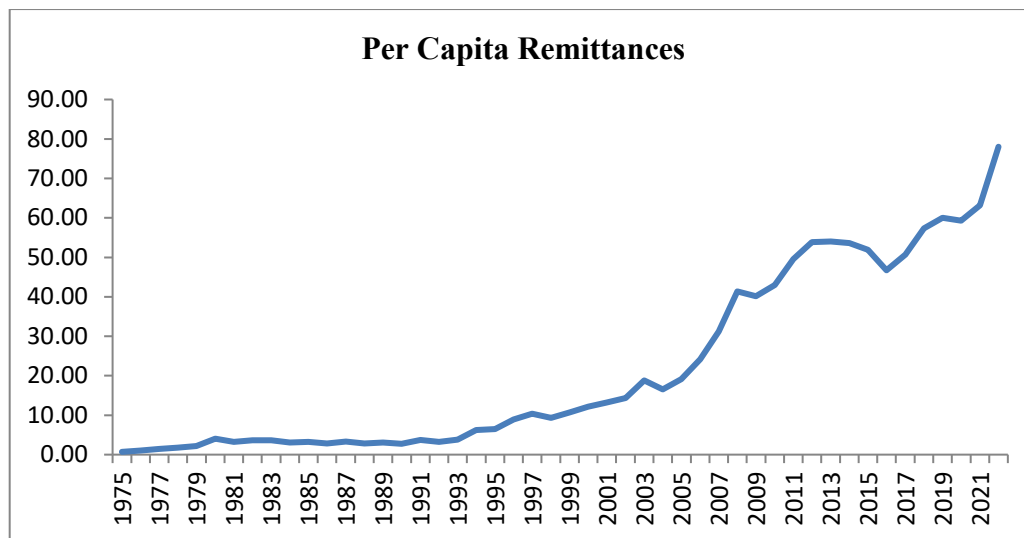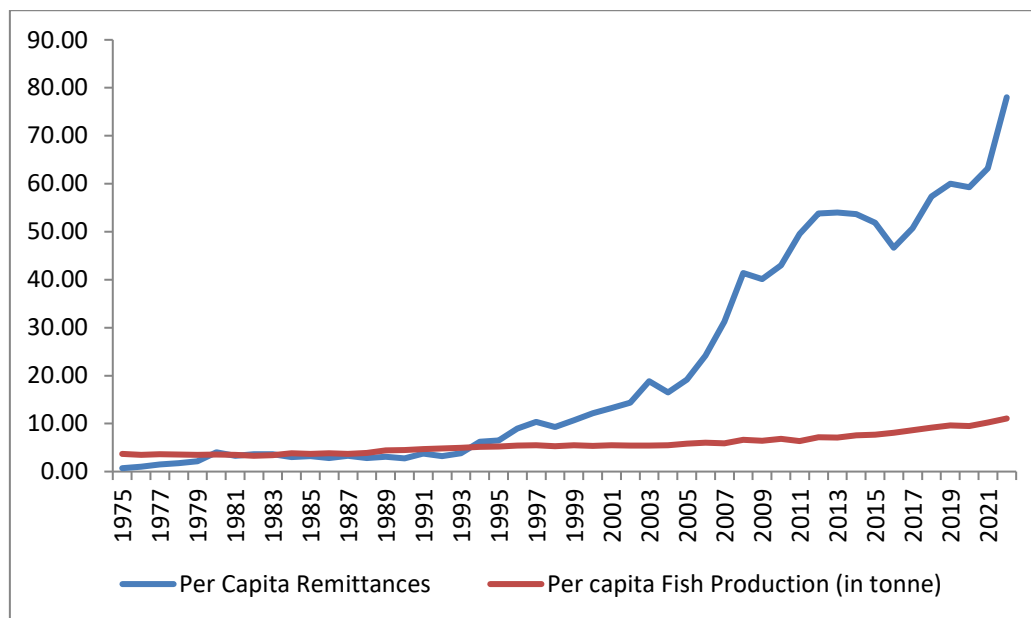**Fig.2 Per capita Remittances in India (World Bank Data, 2023)**

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Fig.3 Both per capita fish production and remittance in India

2. Methodology

2.1 Data Source: This paper has the objective to identify the relationship between remittances and fish production in India. In order to examine this aim, this paper takes data from the World Bank data source, 2023 since 1975-76 to 2022-23. Basically two variables are generated in this study one is per capita remittance (in US $) and another is per capita fish production (in tonne)[1].

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[1] Per capita remittances is the ratio of remittance received to total population and per capita fish production is the ratio of total fish production to total population in the said year.

2.2 Causal Relationship between Per Capita Remittance and Per Capita Fish Production:

This study has the objective to examine the causal relationship between per capita fish production and per capita remittances in India. There are two indicators applying for achieving the results; one is per capita remittances as (Y_t) and another is per capita fish production (X_{1t}) Data is taken from various countries in World Bank, Data Bank source since 1975 to 2022.

In this study, it would like to apply the concept of causality by Granger (1969) for achieving the objective. There are various steps of Granger Causality:

Step-1. According to Granger causality, all the variables (say Y_t and X_t) should be stationary. For the stationary, unit root test is applied by ADF (Augmented Dickey Fuller) test.

$$\Delta Y_t = \beta_1 + \beta_2 t + \delta Y_{t-1} + \Sigma \alpha_i \Delta Y_{t-i} + \varepsilon_t$$

Where ε_t is a pure white noise term and $\Delta Y_t = (Y_t - Y_{t-1})$. In ADF, it is tested that whether $\delta = 0$ or not. If it is zero, variable has unit root i.e. it is non-stationary. Similarly, unit root test is applied for X_t.

Step-2. In Granger causality, lag term would be properly defined. In this work lag term is defined either AIC (Akaike Information Criterion) or SBC (Schwarz Bayesian Criterion).

Step-3. Finally, Causality Model expressed by Gujarati (2007) as:

$$Y_t = \Sigma \alpha_i X_{t-j} + \Sigma \beta_j Y_{t-i} + u_t$$

$$X_t = \Sigma \delta_i Y_{t-i} + \Sigma \gamma_j X_{t-j} + e_t$$

Where it is assumed that u_t and e_t are uncorrelated. And the direction of the causality depends on the significance level of $\Sigma \alpha_i$, $\Sigma \beta_j$, $\Sigma \delta_i$ and $\Sigma \gamma_j$ with the null hypothesis of no causality between Y_t and X_t (Kumar and Kumar, 2014).

3. Result

3.1 Empirical Analysis

Since this paper has the objective to check any relation between fish production and remittance in India since 1975. For the sake of finding relation between them this paper has applied Granger Causality test. In this test it is necessary to find out the stationary of these variables. Per capita fish production is stationary at first

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difference with ADF value -9.549 (0.0000) and per capita remittances is at first difference with ADF value -5.386 (0.0000). Maximum lag structure should be applicable for identifying the causal relationship between them. For this purpose, AIC or SIC criterion has been implemented and as per AIC[2] both variables are used maximum 2 lags but in case of SBC, it is at 1 lag.

Table.1 Granger Causality Test between Per Capita Fish Production and Per Capita Remittances in India

Null Hypothesis	F-Statistic	Probability
Per capita Fish Production does not Granger Cause Per Capita Remittances	4.185	0.0468
Per capita Remittances does not Granger Cause Per Capita Fish Production	0.590	0.4464

Source: Author Calculation

3.2 Interpretation

For Granger causality test, the first null hypothesis is per capita fish production does not cause per capita remittances. The F-value is 4.185 and its probability value is 0.0468, implying it is not accepted at 5 per cent level of significance. That is per capita fish production causes the per capita remittances in India. On the other null hypothesis per capita remittances does not cause per capita fish production. Its F-value is 0.590 with probability value 0.4464, implying it is accepted at 5 percent level of significance. It is therefore to infer that unidirectional causality running from fish production to remittances income in India.

4. Conclusion

This paper has the objective to identify the causal relationship between fish production and remittances income in India since 1975 to 2022. For this purpose this paper has applied Granger Causality test and concluded that there is a unidirectional Granger causality from fish production to remittance income in India.

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[2] Minimum AIC value = 5.4036 at 2 lags but in SBC it is 5.7969 at 1 lag.

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